

SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPUR

DEPARTMENT OF PHYSICS

M. Phil / Ph.D WRITTEN EXAMINATION

Syllabus : Paper I - Research Methodology w.e.f. (2003 - 2004)

1. INSTRUMENTATION AND CHARACTERISATION BY SPECTROSCOPIC TECHNIQUES

IR Spectrophotometer - Instrumentation, sample handling techniques. FTIR Spectroscopy. Application to simple poly atomic molecules like H_2O , CO_2 .

Raman Spectrometer - Sample handling techniques. Laser Raman spectrophotometer. Structure determination by IR and Raman spectroscopy.

NMR Instrumentation - Chemical shift, relaxation processes. NMR spectra of a spin $1/2$ AB system. Interpretation of simple NMR spectra.

X-ray diffraction - Instrumentation of Laue and powder diffraction techniques. Structural analysis of NaCl single crystal and silver wire respectively.

ESR Spectrometer - Instrumentation. EPR of transition metal ions Cu^{2+} and Mn^{2+} . ESR spectra of free radicals.

Mössbauer Spectrometer - Description of the technique. Isomer shift, magnetic hyperfine interaction. Applications of Mössbauer effect. [Straughin and Walker, and Wheatly]

2. SOLID STATE PHYSICS

Crystal growth from melts - Bridgmann and Kyropoulos techniques. Role of dislocation in crystal growth. Purification of crystals - Zone refining technique.

Superconductivity - Types of superconductors, properties. BCS theory. AC and DC Josephson effects. Josephson junctions. High T_c superconductors. Applications of superconductors. [Pillai, Subhadra & Sir Deshmukh]

3. ELECTRONICS

8085 μP - Architecture and organisation of 8085 microprocessor. Addressing modes. Writing assembly language programmes. Stacks and subroutines. Programmable peripheral Interphase (PPI) 8255. Programmable Interval timer 8253.

8086 μP - Architecture and organisation of 8086 microprocessor. Writing simple programmes using assembler.

8051 μ Controller - Architecture and organisation of 8051 microcontroller.

[Goanker]
DV Hall,
K.J. Ayala

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~~Course~~
~~Code~~
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Paper-II (Special)

Molecular Biophysics

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Chapter 1:

Bio molecular Structures – Proteins – Different Structures and Properties – Globular and Fibrous Proteins - Nucleic Acids – Structure of DNA – Watson & Crick Model – Base pairing Schemes – Structure of RNA – Replication of DNA & RNA.

[*Essentials of Biophysics – P. Narayanan*]

Chapter 2:

Introduction to Bio materials – Introduction – Historical developments – Construction materials – Impact of biomaterials – Strength of biological tissues – Performance of implants – Tissue response to implants – Interfacial phenomena.

[*Bio Materials - Sujata V. Bhat, Narosa Publishing House –2002*]

Chapter 3:

Physical methods of Determining the sizes and shapes of Macro molecules – Diffusion – Measurement of Diffusion constant – Sedimentation – Sedimentation equilibrium method – Sedimentation velocity method – viscosity – Rotational diffusion – Flow birefringence measurements – Electric birefringence – Light Scattering – small angle X-ray Scattering.

[*Molecular Biophysics – Setlow and Pollard., Biophysics – Vasanthat pattabhi & Gowtham., Biophysics – Hoppe & Lohmann.*]

Chapter 4:

Spectroscopic studies of Macromolecules – Origin & Basic instrumentation details of UV, visible, IR and Raman and Laser Raman Spectroscopy – Effects of Double and triple bonds on UV Curves and IR group frequencies studies on amino acids and polypeptides.

[*Spectroscopy – B.K.Sharma – Goal Publishing House, Meerut.*]

Chapter 5:

NMR – Basic principles of NMR theory and experiment - chemical shift - intensity - relaxation parameters – Nuclear Overhauser Effect - NMR application to Biophysics – conformation of biomolecules – Two Dimensional NMR – Determination of macromolecular structure – NMR in Medicine.

[*Biophysics – Vasanthat pattabhi & Gowtham., Biophysics– Hoppe&Lohmann.*]